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On Dioscorea deltoidea, Wall., *Dioscorea quinqueloba*, Thunb., and
their allies.—By D. PRAIN AND I. H. BURKILL.

In the following paper we describe eleven species of *Dioscorea*—three Indian, three Chinese, and five Japanese. They are all allied plants, with many characters in common: and as it may perhaps conduce to clearness we give the common characters as a preliminary.

Characters which these Yams have in common.

- I. Tubers as far as known inedible, not lying deep in the soil, at times growing like rhizomes parallel with the surface.
- II. Stems always twining to the left.
- III. Leaves cordate (or truncate below), constricted more or less towards the middle, or else lobed, with 5-9 palmately arranged nerves.
- IV. Male flowers generally two or more together.
- V. Female spikes pendulous, with recurved fruit.
- VI. Wings of capsules with a tendency to be quadrate.
- VII. Seeds winged all round but irregularly so, apparently distributed as from swinging censers by the movement of the flexuous slender spikes in the wind.

The species group themselves naturally in a way that more or less accords with their distribution. The first little group contains four,—

Dioscorea deltoidea, *D. sikkimensis*, *D. Prazeri*, and *D. panthaica* which are found in the lower Himalaya and mountains east of it: they are all closely allied. Next stands rather alone *D. acerifolia* from Central China. Thirdly come the three closely allied Japanese species *D. septemloba*, *D. nipponica* and *D. quinqueloba*. Lastly stand two species from Japan, *D. tenuipes* and *D. Yokusai*, associated with *D. emneaneura* from Central China. Uline, who has recently done valuable work upon the genus *Dioscorea*, refers some of the species to a section which he names *Stenophora*; but it is not clear to us if he would so refer all. We therefore leave undiscussed for the present the question of sections.

Dioscorea birmanica, which we described in a recent paper, is allied to the yams under discussion; but, with the horizontal inedible rhizome and dependent female inflorescences and the censer mechanism for seed distribution, it combines leaves not constricted or lobed, as well as a robustness which is foreign to all except, it may be, *D. acerifolia*; moreover none are thorny to the degree that it is, and none have precisely similar cymules of male flowers.

The following is a key to the species which we shall forthwith describe:—

Anthers not didymous:—

Leaves quite smooth beneath:—

- | | | | | |
|-----------------------------|-----|-----|-----|----------------------|
| Male flowers not pedicelled | ... | ... | ... | <i>Prazeri</i> . |
| Male flowers pedicelled | ... | ... | ... | <i>sikkimensis</i> . |

Leaves with hairs or papillæ beneath:—

Male flowers sessile:—

- | | | | | |
|---|-----|-----|-----|--------------------|
| Male inflorescence slender, little branched | ... | ... | ... | <i>deltoidea</i> . |
| Male inflorescence much branched, subthyrsoid | ... | ... | ... | <i>panthaica</i> . |

Male flowers stalked:—

- | | | | | |
|-----------------------------------|-----|-----|-----|----------------------|
| Male inflorescence long and rigid | ... | ... | ... | <i>acerifolia</i> . |
| Male inflorescence slender:— | | | | |
| Leaves 7-lobed, lobes acute | ... | ... | ... | <i>septemloba</i> . |
| Leaves 3-5-lobed, lobes obtuse:— | | | | |
| Capsule longer than wide | ... | ... | ... | <i>nipponica</i> . |
| Capsule as wide as long | ... | ... | ... | <i>quinqueloba</i> . |

Anthers didymous:—

- | | | | | |
|--|-----|-----|-----|---------------------|
| Perianth segments equal | ... | ... | ... | <i>tenuipes</i> . |
| Perianth segments unequal:— | | | | |
| Male flowers in cymules, larger | ... | ... | ... | <i>Yokusai</i> . |
| Male flowers solitary or in pairs, smaller | ... | ... | ... | <i>emneaneura</i> . |

DIOSCOREA PRAZERI. *Rhizoma* crassum, aliquanto informe, parum hypogæum, venenosum, carne albo. *Caulis* e radice singulus, glaber, sinisterosum volubilis, teretiusculus, iuermis, viridis, bulbifer. *Folia* alterna, chartacea, utrinque glaberrima, subtus glauca, pellucide punctata,

late cordata vel sursum ovato-cordata, acuminata, apice minutissime mucronulata, basis sinu lato vel latissimo, margine nonnunquam plus minusve undulata, 7- vel 9-nervia, nervis extimis profunde bifidis, nervulis secundariis reticulatis utrinque distinctis, plurima 8-12 cm. longa 10-16 cm. lata, nonnunquam tamen ad 20 cm. longa lataque: petiolus glaber, sulcatus, 4-7 cm. longus. *Spicæ masculæ* simplices (rarius singulæ sæpius 2-6-næ) vel paniculatæ, axillares; flores glomerati, 2-3-ni, sessiles in rhachi trigona sparsim sed fere prorsus dispositi: pedunculus glaber: bracteæ sub ramulis panicularum lanceolatae 3mm. longæ, sub glomerulis florum ovato-lanceolatae: bracteolæ ovato-acuminatæ, naviculari-concavæ. *Perianthii masculi* laciniae ovatæ, obtusæ, subæquales et subsimiles, patentes. *Stamina* 6, æqualia, filamentis æquilonga: antheræ filamentis multo breviores. *Spicæ femineæ* axillares, solitariae, simplices, ad 12 cm. longæ, dependentes; flores ad 10-12, sessiles, deorsum spectantes, circiter 1 cm. remoti: bracteæ et bracteolæ adsunt. *Capsulæ* sessiles, assurgentes: alæ maturæ pergamentaceæ, irregulariter subquadrato-semicirculares, 2.5 cm. longæ, 1.5 cm. latæ, stramineo-corneæ, glaucescentes. *Semina* in loculo quoque gemina, ovato-oblonga, .85 cm. lata, 1.25 cm. longa circuncirca alata, rufo-brunnea.

NORTHERN BURMA. Upper Chindwin District: Sittaung, *Prager*. Bhamo District: Bhamo, *Burkill* in herb. R.E.P. 21537; Momouk, east of Bhamo, *Burkill* in herb. R.E.P. 21507, 21509, 21514. Katha District: Katha, in forests on black soil, *Burkill* in herb. R.E.P. 21557, 22493, 22494, 22495, 22496, 22652, 22658, 22664, 22665.

In the districts of Bhamo and Katha this *Dioscorea* occurs in the forests of Dipterocarps.

DIOSCOREA SIKKIMENSIS. *Rhizoma* crassum, aliquanto informe, parum hypogæum, venosum, carne luteo-albo. *Caulis* e radice singulus, glaber, sinistrorsum volubilis, teretiusculus, inermis, purpureo suffusus, bulbifer (an semper?). *Folia* alterna, chartacea, utrinque glaberrima, subtus læte viridia, pellucide punctata, subdeltoideo-ovato-cordata vel late cordata, acuminata, apice minutissime mucronulata, basis sinu lato vel latissimo, margine nonnunquam plus minusve undulata, 7- vel 9-nervia, nervis extimis profunde bifidis, nervulis secundariis reticulatis utrinque distinctis, plurima 9-16 cm. longa, 7-9 cm. lata nonnunquam tamen usque ad 20 cm. longa lataque: petiolus glaber, sulcatus, 4-7 cm. longus. *Spicæ masculæ* simplices vel rarius paniculatæ, singulæ vel binæ vel ternæ, axillares: flores glomerati, 2-3-ni, breviter pedicellati, glomerulis in rhachi trigona 2-4 mm. distantibus:

pedunculus glaber: bracteæ sub ramulis panicularum lanceolatae, 3 mm. longæ, sub glomerulis ovato-lanceolatae pedicellos subæquantes: bracteolæ ovato-acuminatæ, naviculari-concavæ, pedicellis dimidio breviores. *Perianthii masculi* lacinia ovata, subacuta, subæquales et subsimiles, patentes. *Stamina* 6, æqualia, filamentis æquilonga: antheræ filamentis breviores. *Spicæ femineæ* axillares, solitariae, simplices, ad 12 cm. longæ, dependentes; flores ad 10–12, sessiles, deorsum spectantes, circiter 1 cm. remoti: bracteæ et bracteolæ adsunt. *Capsulæ* sessiles, assurgentes: alæ maturæ pergamentaceæ, irregulariter subquadratae, 2 cm. longæ, 1 cm. latæ, stramineo-corneæ, livido suffusæ, glaucescentes, majores ad 2.75 cm. longæ, ad 1.6 cm. latæ. *Semina* in loculo quoque gemina, complanata, subquadrata, .85 cm. diam., ala membranacea alba inæqualiter circumcincta.—*Dioscorea deltoidea*, Hook. f., Fl. Brit. Ind. VI., (1892), 291, partim.

EASTERN HIMALAYA. Sikkim: without precise locality, 1000–5000, feet, *J. D. Hooker*, No. 7, Herb. Ind. Or.; Herb. *Griffith*, 5555; Great Rungeet, 1800–2500 feet, *T. Anderson*; Rungeet Valley, *Kurz*; Rungeet, *C. B. Clarke*, 8936; Rungneet Valley, 4000 feet, *Gamble*, 9764; Dikiling, 2000 feet, *C. B. Clarke*, 9682; Naksabari, *Gamble*, 322 D; Tukwar, 3000 feet, *Gamble*, 9799; Pashok, 7000 feet, *Lister*; Mungpoo, *Hartless*, *Gammie*, *Dungboo*, 2000 feet and 3500 feet, *King*; also 600–3000 feet, *King*; Restrop, *Prain's Collector*; Silake, *Prain*; Nagree, 3000 feet, *T. Anderson*; between Richi and Rinchongpong, 2000–2500 feet, *T. Anderson*. Western Duars: *Haines*, 4187. Nepal: *Scully*, 34.

Dioscorea sikkimensis is the Kencheong or Kúkur Turul of Sikkim. It was included in *D. deltoidea* in the Flora of British India by Sir Joseph Hooker. It is indeed closely allied to that species: but it differs markedly in the absence of the short crisp simple hairs that are so abundant on the veins and nerves of the under surface of the leaf of *D. deltoidea*. There are besides other differences: the rachis of the inflorescence in both sexes of *D. sikkimensis* is distinctly angled, while that of *D. deltoidea* in the male is terete and in the female only slightly angled: the fruit is also slightly different in shape; it is sessile and destitute of purple lines or dots in *D. sikkimensis*, while that of *D. deltoidea* is distinctly pedicelled. It is to be noted that both *D. deltoidea* and *D. sikkimensis* occur in Central Nepal, which is the eastern limit of the one and the western limit of the other.

More closely allied to *D. sikkimensis* than *D. deltoidea*, is *D. Prazeri*. The chief differences between the two are (i) in the male flowers, which in *D. Prazeri* are sessile and in *D. sikkimensis* are distinctly pedicelled, (ii) in the seeds, which are of a different colour and shape, and (iii) in the foliage which is chiefly composed of wide cordate leaves in the Burmese plant, though there are leaves on the ultimate branches which are longer than broad as is the usual condition in the Sikkim plant. In *D. sikkimensis* such leaves as there may be, which are as long as they are broad, are confined to the lower part of the main stem. The male plant of *D. Prazeri* is often bulbiferous: this is a rare condition in *D. sikkimensis*. The bulbils of both

when present are smooth with a silvery skin: the specimen of *D. Prazeri* collected by one of us at Momonk, east of Bhamo, close to the Chinese frontier, had such silvery bulbils, slightly verrucose, and Haines notes on the ticket of his Duars specimen that it bore bulbils with a silvery smooth skin.

We have had the two species in cultivation, side by side, at the Royal Botanic Gardens, Sibpur, where they flowered simultaneously, but at the end of September the leaves of *D. Prazeri* were in full defoliation, while *D. sikkimensis* as still in vigorous growth.

DIOSCOREA DELTOIDEA, Wall. *Rhizoma* crassum, aliquanto informe, parum hypogæum, venenosum, carne albido. *Caulis* glaber, sinistrorsum volubilis, teretiusculus, inermis, viridis. *Folia* alterna, chartacea, supra glaberrima, subtus ad nervos et nervulos pilis minutis simplicibus hirtella, pellucide lineolata, basis sinu lato vel latissimo, subdeltoideo-cordato-ovata, acuminata, apice minutissime mucronulata, margine sæpissime plus minus undulata neonon aliquomodo ad medium constricta, 7-nervia, nervis extimis profunde bifidis, vel 9-nervia, nervulis secundariis reticulatis utrinque distinctis, ad 12 cm. longa, ad 10 cm. lata: petiolus glaber, sulcatus, tenuis, 4-12 cm. longus. *Spicæ masculæ* simplices vel (inferiores) compositæ, axillares; flores glomerati, 2-3-ni, sessiles, in rhachi angulata glomerulis 5-1 cm. distantibus sparsim dispositi: pedunculus glaber, simplex ad 15 cm. longus vel maximus ad 30 cm.: bracteæ lanceolatae, ad 2 mm. longæ: bracteolæ ovato-acuminatae, naviculari-concavæ, glabræ, floribus dimidio breviores. *Perianthii masculi* lacinia ovata, obtusæ, subæquales, patentes. *Stamina* 6, æqualia, filamentis æquilonga; antheræ filamentis multo breviores. *Spicæ feminæ* axillares, solitariae, simplices, 8-15 cm. vel rarissime ad 25 cm. usque longæ, dependentes: flores 4-12, breviter pedicellati, deorsum spectantes, circiter 1 cm. remoti: bracteæ et bracteolæ adsunt. *Capsulæ* breviter pedicellatæ, assurgentes: alæ maturæ pergamentaceæ, vertice versus subquadratae, basin versus rotundatae, stramineo-corneæ, punctulis lineolisque purpureis horizontaliter notatae, ad 3 cm. longæ, 1.6 cm. latæ. *Semina* in quoque loculo gemina, latissima, complanata, 11 mm. longa, 15-18 mm. lata, ala membranacea loculam fere implente inæqualiter circumcincta,—*Dioscorea deltoidea*, Wall. Cat. (1832), 5100; Stewart in Journ. Agric. and Hort. Soc. Ind. XIV., (1867), p. 37; Kunth, Enum. V., (1850), 340; Hook. f., Flor. Brit. Ind. VI., (1892). 291 pro parte; Duthie in Records Bot. Survey Ind. I., (1898), 173, Lawrence, Valley of Kashmir, (1895), p. 75; Griseb. in Mart., Flor; Brasil., III., (1842), i. 43, quoad Wall. Cat., 5100, sed ref. ad Rumph. Hort. Amb., V., t. 180 exclus.

NORTH-WEST HIMALAYA. Without locality, *Stoliczka*: Herb. Falconer, 1116. Chitral: Ziarat, 7200 feet, *Harriss*, 16683, 16684. Dir:

Mirga, 7200 feet, *Gatacre*, 17567, 17568. Hazara district: without precise locality, but abundant in many places, 3000–6000 feet, *Stewart*; hill between Mahowa and Bojdarrah, *Stewart* in litt, l. c.; Khagan, Valley, 4800 feet, *Inayat*, 20205, 20205a, *Stewart*, 603½. Kashmir: near Muliyal, *Winterbottom*, 336; Baramula, *Winterbottom*, 335; above Shapiyon, 7000 feet, *C. B. Clarke*, 28566. Chamba: between Tisa Nala and Bara, 6000 feet, *Lace*, 1381; Pangi, on the Chenab, *Brandis*, 3362; Kulal Forest in Pangi, 8000 feet, *Lace*, 1669. Kulu: Phulga, *Watt*, 13473. Simla: Gowai, 6000 feet, *Gamble*, 5140; Narkanda *Brandis*; Chur, 8000 feet, *J. R. Drummoud*: Jubal, 5000–7000 feet, *Edgeworth*. Bhaji Forest, *Kalka Pershad* in herb. R. E. P. 19065. Bashahr: Dippi, 7000 feet, *Brandis*, 3361. Jaunsar: Konam, 7000 feet, *Webb*, 153. Dehra Dhun: Mussoori, *Brandis*, 1477, *King*; Mussoori Range, *King*. Tehri-Garhwal: Ganges valley near Jhala, 8000–9000 feet, *Duthie*. British Garhwal: *King*. Kumaon: Kuntagong, 5000–8000 feet, *T. Thomson*; near Kathe, 7500 feet, and Valley of Sarju at 3500 feet, *Strachey and Winterbottom*, 1; Sujahce Devee, Punath Village, Barchoola Ridge, *Strachey and Winterbottom* 68; near Kupkot, 3500 feet, *Strachey and Winterbottom*, 570. Nepal: Sankas, *Wallich*, 5110.

Dioscorea deltoidea may flower very much earlier than its allies; it was collected in young fruit in the Bhaji Forests in the end of May.

Although in no places eaten as food, it is not without its uses. Sir George Watt notes on the ticket of his specimen "Roots used for washing clothes, especially wool; vern. name "Shingli"; and Sir Walter Lawrence in his Valley of Kashmir, p. 75, calls it Krits, and says that the root is used as a diuretic in doses of 1 dram, and that in large doses it is a poison. E. T. Atkinson in the Gazetteer of the North-Western Provinces, X., (1882), p. 703, names a plant as *D. deltoidea*, and calls it "Gun" in the vernacular: doubtless he means *D. deltoidea*. *Stewart* in his Panjab Plants, (1869), p. 128, under *D. deltoidea*, gives a number of vernacular names many of which seem to belong to another widely distinct species of *Dioscorea*.

DIOSCOREA PANTHAICA. *Radix* ignota. *Caules* glabri, sinistrorsum volubiles, teretiusculi, ad basin petioli spinis flaccidis stipulinis obsiti, purpurei. *Folia* alterna, chartacea, supra glaberrima, subtus ad nervos et nervulos papillis minutissimis simplicibus densius hirtella, pellucide punctata, subdeltoideo-ovato-cordata, acuminata, apice minutissime mucronulata, basis sinu latissimo, margine plus minus undulata, 7-nervia, nervis extimis profunde bifidis, vel 9-nervia, nervulis secundariis reticulatis parum distinctis, 8.5 cm. longa, 6 cm. lata: petiolus glaber, sulcatus, tenuis, 5 cm. longus. *Spicæ masculæ* simplices, in paniculas axillares dispositæ; flores 2-ni in glomerulis sessilibus 4–6 mm. remotis in rhachi nonnunquam minopere angulata

ad angulas nonnunquam papilloso-lineolata dispositi: panicula 12 cm. longa: spicarum rhachides 4·5 cm. longæ: pedunculus paniculæ 3 cm. longus: bracteæ lanceolatae, ad 1·5 mm. longæ: bracteolæ ovato-acuminatae, naviculari-concavae, glabrae, floribus breviores. *Perianthii masculi* laciniae ovato-oblongae, obtusae, subæquales et subsimiles patentes. *Stamina* 6, æqualia, antheræ filamentis multo breviores. *Planta feminea* ignota.

SOUTH-WEST CHINA. Yunnan: Mengtse, northern mountains, at 7000 feet, *A. Henry*, 11065.

This species seems to be most nearly allied to *D. deltoidea*.

DIOSCOREA ACERIFOLIA, Uline ex Diels. *Radix* ignota. *Caules* glabri, sinistrorsum volubiles, teretes, inermes, nigro-purpurei. *Folia* alterna chartacea, supra glaberrima, subtus ad nervos et nervulos pilis minutis nunc sparsim nunc densius hirtella, pellucide lineolata, cordato-acuminata, apice minutissime mucronulata, basis sinu latissimo, margine undulata vel sæpius palmatim sinuata vel lobata, lobis obtusis vel nonnunquam acutis, 9- vel 11-nervia, nervis extimis profunde bifidis vel trifidis, nervulis secundariis reticulatis subtus distinctis, 10–18 cm. longa, 10–12 cm. lata: petiolus apicem versus hirtellus, cæterum glaber, crassior, supra canaliculatus, 10–12 cm. longus. *Spicæ masculæ* simplices vel parum ramosæ, sæpius solitariae, nonnunquam binæ, axillares, 20–25 cm. longæ: flores in cymulas in rhachi puberula 5–7 mm. remotas dispositi: pedunculus puberulus, 4·5–5 cm. longus: bracteæ lanceolatae, ad 2 mm. longæ: bracteolæ ovatae, acuminatae, glabrae, floribus breviores. *Perianthii masculi* laciniae ovato-oblongae, obtusae, subæquales, patentes. *Stamina* 6, æqualia; antheræ filamentis paullo breviores. *Spicæ femineæ* axillares, solitariae, simplices, 16–20 cm. longæ, dependentes; flores 30–40, sessiles, deorsum spectantes, circa 75 cm. remoti: bracteæ et bracteolæ adsunt. *Capsulæ* sessiles, assurgentes: alæ maturæ pergamentaceæ, basin versus rotundatae, apice parum retusæ, stramineæ, purpureo notatae, 2 cm. longæ, 8 cm. latæ. *Semina* in loculo quoque gemina, obovata, complanata, ala membranacea alba irregulariter circumcincta. *Dioscorea acerifolia*, Uline ex Diels in Engl. Bot. Jahrb. XXIX., (1900), 261. *D. quinqueloba*, C. H. Wright, in Journ. Linn. Soc. Bot. XXXI, (1903), 92 (syn. excl.).

CENTRAL CHINA. Hupeh: without precise locality, *A. Henry*, 150-Chiensih, *A. Henry*, 5870; Patung, *A. Henry*, 7358.

Wright, uniting *D. acerifolia* and *D. quinqueloba*, adds to the above localities some in northern China: we are unable to state to which of the two species these northern specimens belong. Diels adds to Dr. Henry's localities in Central China

“Nanshan, *Rosthorn*, 2128”: and he further describes a variety, naming it var. *Rosthornii*, also from Nanshan, in the following words:—“foliis amplis acutissime acuminatis subtus ad nervos albo-setulosis ideoque cinerascensibus.”

DIOSCOREA SEPTEMLOBA, Thunb. *Radix* ignota. *Caules* glabri, sinistrorsum volubiles, teretes, inermes, virides. *Folia* alterna, tenuiter chartacea, supra glaberrima, subtus ad nervulos minute papillosa, opaca nec pellucide lineolata, ex siccitate brunnea, cordata, acuminata, apice minutissime mucronulata, basis sinu lato, margine septemloba lobis basalibus obtusis sed cæteris subacutis vel acutis, 7-nervia, nervis extimis profunde bifidis, nervulis secundariis reticulatis subtus distinctis sursum obscuris, 10 cm. longa, 12 cm. lata. *Spicæ masculæ* ignotæ. *Spicæ femineæ* axillares, solitariæ, simplices, 8–10 cm. longæ, dependentes; flores 10–12, sessiles, circiter 1 cm. remoti: bracteæ fructu maturo late ovatæ: bracteolæ ovatæ, acuminatæ. *Capsulæ* sessiles, assurgentes, colore cupreæ: alæ maturæ pergamentaceæ, basin versus attenuatæ, apice rotundato-truncatæ, 2 cm. longæ, 1.2 cm. latæ, castaneæ. *Semina* in quoque loculo gemina, obovata, complanata, ala membranacea alba inæqualiter circumcincta. *Dioscorea septemloba*, Thunb., Fl. Jap., (1784), 149. *D. quinqueloba*, Franchet et Savatier, Enum. Flor. Jap., II., (1879), 46.

CENTRAL JAPAN. Island of Nippon: Joshu (Hitachi); Yubiso, *Makino*.

Makino gives the Japanese name as Momiji-dokoro on the label of a herbarium specimen kindly sent to us from the Hongkong Herbarium by Mr. S. T. Dunn.

DIOSCOREA NIPPONICA, *Makino*. *Radix* ignota. *Caules* glabri, sinistrorsum volubiles, teretes, inermes, virides. *Folia* alterna, chartacea, supra glaberrima, subtus ad nervos et nervulos pilis albis simplicibus hirtella, opaca nec pellucide lineolata, subdeltoideo-cordato-ovata, acuminata, apice minutissime mucronulata, basis sinu lato, margine undulata vel parum 5–7-lobata, lobis rarissime subacutis, 7–9-nervia, nervis extimis bifidis, nervulis secundariis supra obscuris subtus subdistinctis, 7–10 cm. longa, 5–10 cm. lata: petiolus apicem versus hirtellus, cæterum glaber, gracilis, supra canaliculatus, 4–8 cm. longus. *Spicæ masculæ* ignotæ. *Spicæ femineæ* axillares, simplices, singulæ, 15–25 cm. longæ, dependentes: flores 25–30, sessiles, deorsum spectantes, 5–8 mm. remoti: bracteæ lineari-lanceolatæ, acutissimæ: bracteolæ similes, minores. *Capsulæ* sessiles, assurgentes, stramineæ, purpureo-punctatæ: alæ maturæ semiovatæ, apice retusæ, basin versus attenuatæ vel rotundatæ, stramineæ, 2 cm. longæ, 6–7 cm. latæ. *Semina* in quoque loculo gemina, ovata, complanata, ala membranacea alba inæqualiter circumcincta.

Dioscorea nipponica Makino, Illustr. Flor. Jap., I., (? 1891) No. 1 (not seen).

CENTRAL JAPAN. Island of Nippon: Joshu (Hitachi); Schimizutoge, Makino.

Makino gives the Japanese name as Uchiwa dokoro on the label of a herbarium specimen kindly sent to us by Mr. S. T. Dunn from the Hongkong Herbarium. Besides this specimen we have seen a coloured drawing of the fruit made by Mr. Makino.

DIOSCOREA QUINQUELOBA, Thunb. *Radix* ignota. *Caules* glabri, sinis; trorsum volubiles, teretes, inermes, virides. *Folia* alterna, tenuiter chartacea, supra glaberrima, subtus nonnunquam ad nervos et nervulos pilis minutis simplicibus hirtella, pellucido lineolata, cordata, acuminata, apice minutissime mucronulata, basis sinu lato, infima septem—, rare novem—, loba, media quinqueloba, superiora triloba vel sinuata, 7-nervia, nervis extimis profunde bifidis, nervulis secundariis reticulatis utrinque distinctis, 6–8 cm. longa, 5–10 cm. lata: petiolus glaber, canaliculatus, 3–7 cm. longus. *Spicæ masculæ* simplices vel ramosæ, solitariæ vel binæ, axillares, 4–6 cm. longæ pedunculo 5–10 cm. longo incluso: flores pedicellati, in cymulis 3–4 cm. remotis dispositi: rhachis pedunculatusque glabri: bracteæ lanceolatae, 1.5 mm. longæ: bracteolæ ovatae, acutæ, glabræ, floribus breviores. *Perianthii masculi* laciniæ ovatae, obtusæ, subæquales, patentes. *Stamina* 6, æqualia: antheræ filamentis multo longiores. *Spicæ feminæ* axillares, solitariæ vel geminæ, simplices, 10–12 cm. longæ, dependentes; flores 10–12, breviter pedicellati, deorsum spectantes, circa .75 cm. remoti: bracteæ et bracteolæ adsunt. *Capsulæ* assurgentes: alæ maturæ pergamentaceæ, basin versus rotundata, apice truncatæ, 1.75 cm. longæ, .7 cm. latæ, stramineæ. *Semina* in quoque loculo gemina, latissima, complanata, ala membranacea alba inæqualiter circumcincta.—*Dioscorea quinqueloba*, Thunb. Flor. Jap., (1784), 150; Kämpfer, Ic. Sel., (1791), t. 15 (a satisfactory picture) Somoku Dusets, 2nd. ed., XX., t. 54.

SOUTHERN JAPAN. Island of Kiusiu, Nagasaki, Buerger, *Oldham* 890, *Maximowicz*.

The Japanese name as given in the Somoku Dusets is Kikuba Dokoro.

DIOSCOREA TENUIPES, Franchet et Savatier. *Radix* nobis ignota, teste Franchetio Savatieroque tuberosa et depresso-globosa. *Caules* glabri, sinistrorsum volubiles, teretiusculi, juniores minopere angulati, inermes, virides. *Folia* alterna, membranacea, glaberrima, nitentia, margine interdum undulationibus minutis notata, cordato-ovato-acuminata

vel subdeltoideo-cordata-ovato-acuminato, apice mucronulata, basis sinu lato, aliquomodo ad medium constricta, 7-9-nervia, nervis extimis profunde bifidis, nervulis secundariis reticulatis utrinque distinctis, ad 9-10 cm. longa, 6-10 cm. lata: petiolus glaber, supra parum canaliculatus, 6 cm. longus. *Racemi masculi* simplices, solitarii vel 2-4-ni, 10 cm. longi; flores longius pedicellati, glomerati, 2-5-ni (glomerulis 75 cm. remotis) sparsim dispositi: pedicelli 3-5 mm. longi (teste Franchetio Savatieroque 5-8 mm. longi). Pedunculus glaber, ad 3 cm. longus; bracteae ovato-lanceolatae, ad 2 mm. longae; bracteolae suborbiculatae, glabrae, pedicellis multo breviores. *Perianthii masculi* laciniae lanceolatae, obtusiusculae, refractae, subaequales. *Stamina* 6, aequalia, perianthio distincte breviora: antherae didymae. *Spicae femineae* axillares, simplices, solitariae, usque ad 12-15 cm. longae, dependentes; flores ad 25, solitarii vel cymulosim bini (alter major alter minor) in ramulis perbrevibus 5-7 mm. distantibus dispositi, deorsum spectantes: rhachis distincte trigona, aliquomodo zigzag. *Perianthii masculi* laciniae iis floris masculi similes: bracteae et bracteolae adsunt. *Capsulae* assurgentes, latiores quam longae, basi et apice emarginatae (teste Franchetio Savatieroque). *Semina* (teste Maximowicz) circumcirca alata.—*Dioscorea tenuipes*, Franchet et Savatier, Enum. Flor. Jap., II., 525. *Dioscorea sativa*, Miq., Prolusio Flor. Jap., (1867), 323, quoad plantam masculam.

SOUTHERN JAPAN. Island of Kiusiu: Nagasaki, *Maximowicz*. Island of Shikoku: Tosa; Nanokawa, *Makino*.

DIOSCOREA YOKUSAI. *Radix* ignota. *Caules* glabri, sinistrorsum volubiles, minopere angulati, inermes, virides. *Folia* alterna, membranacea, glaberrima, nifentia, cordato-acuta vel breviter acuminata, apice mucronulata, sinu basis latissimo, margine integra vel plus minus undulata, nonnunquam ad medium constricta, 7-nervia, nervis extimis profunde bifidis, nervulis secundariis reticulatis subtus distinctis, 5 cm. longa, 5 cm. lata: petiolus glaber, gracilis, supra profunde canaliculatus, 3.5 cm. longus. *Inflorescentia mascula* per rhachin angulatam ad 7 cm. longam cymulas 3-5-floras 5-10 mm. remotas gerens: flores distincte pedicellati, pedicellis 2-3 mm. longis: pedunculus glaber, angulatus, 2-3 cm. longus: bracteae ovato-lanceolatae, acutae vel acuminatae, ad 2 mm. longae: bracteolae ovatae, acutae, pedicellis multo breviores. *Perianthii masculi* laciniae biseriatae, exteriores ovato-lanceolatae subacutae, interiores obovatae obtusae vel truncatae, patentes. *Stamina* 6, aequalia, perianthio distincte breviora: antherae didymae. *Spicae femineae* axillares, simplices, solitariae, usque ad 8 cm. longae, dependentes; flores

solitarii sessiles, 5–7 mm. distantes, deorsum spectantes: rhachis distincte trigona, aliquomodo zigzag: bractæ et bracteolæ adsunt. *Perianthii feminei* lacinia lanceolata, subacuta, subæquales. *Capsule* assurgentes, æquilongæ et latæ, maturæ non visæ.

JAPAN. Without precise locality, *Buerger* (mixed with *Dioscorea Batatas* and issued by Miquel as *D. japonica*).

This species is most nearly allied to *D. tenuipes* with which it agrees in the didymous stamens and in the distinctly pedicelled male flowers: but from which it differs markedly in the biseriate perianth, the lobes of which are not refracted, in the rather shorter and stouter pedicels, the thicker and larger perianth-lobes and in the distinctly cymulose (not glomerate) clusters of flowers. The fruits, which we have not seen ripe, when young closely resemble those of *D. tenuipes*. We suspect that this may prove to be the plant for which Uline has proposed the name *D. Buergeri* (teste Diels in Engl. Bot. Jahrb., XXIX., 260), but we have not seen specimens which could corroborate the idea. We have therefore been compelled to find a new name for it, and have thought well to connect the name of the author of the *Somoku Dusets* with it.

DIOSCOREA ENNEANEURA. *Radix* ignota. *Caules* glabri, sinistrorsum volubiles, minopere angulati, inermes, virides. *Folia* alterna, membranacea, supra glaberrima subnitentia, subtus nervis et præcipue nervulis secundariis minute rugoso-cristatis, cordata, breviter acuminata, apice mucronulata, basis sinu obtuso, margine integra, 9-nervia, nervis extimis profunde bifidis, nervulis secundariis distinctis subtus prominulis, 6 cm. longa, 5 cm. dimidio lata: petiolus glaber, gracilis supra canaliculatus, 3.5 cm. longus. *Racemi masculi* simplices, axillares, solitarii; flores solitarii vel bini, distincte pedicellati, sparsim 3–4 mm. remoti, pedicellis 2 mm. longis: pedunculus glaber, 5 mm. longus: rhachis ad 4 vel 5 cm. longus: bractæ ovato-lanceolatae, ad 2 mm. longæ: bracteolæ subsimiles, pedicellis dimidio breviores. *Perianthii masculi* lacinia ovato-lanceolata, biseriata, exteriores acutæ ad medium incrassatæ, interiores obtusæ vel truncatæ fere ad apicem incrassatæ, patentés. *Stamina* 6, æqualia, perianthio distincte breviora: antheræ didymæ. *Planta feminea* ignota.—*Dioscorea Buergeri*, var., enneaneura, Uline ex Diels in Engl. Bot. Jahrb., XXIX., (1900), 260, nomen tantum.

CENTRAL CHINA.—Hupeh. A. Henry, 3641 A.

This species is most nearly related to the plant here described as *D. Yokusai*. It differs very markedly in the much smaller flowers which are solitary or geminate and not cymulose on the rhachis.